

Remarks

Claims 1-43 are pending in the application. Claims 23-43 have been allowed. However, claims 1-22 remain rejected under 35 U.S.C. § 102(b) and 35 U.S.C. § 103 in view of Kosugi. In view of the following remarks, reconsideration and withdrawal of these grounds of rejection is requested.

Claim Rejections Under 35 U.S.C. § 102

Claim 1 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Kosugi. (U.S. Pat. No. 5,500,556). In view of the following remarks, reconsideration and withdrawal of this ground of rejection is respectfully requested.

The present invention comprises, in one exemplary embodiment, a microwave/millimeter wave circuit 110 (See Figs. 1a and 1b). The circuit includes a first metallization layer 112a, a second metallization layer 112b, and a dielectric layer 117 sandwiched therebetween. The circuit also includes at least one conductive via 119 extending from the first metallization layer 112a to the second metallization layer 112b, through the dielectric 117.

Claim 1 recites:

A multilayer microwave or mm-wave circuit comprising: a first metallization layer, at least a portion of said first metallization layer adapted for operation at a frequency ranging from 20GHz to 100 GHz; a second metallization layer, at least a portion of said second metallization layer adapted for operation as a ground plane; a dielectric substrate layer, said dielectric substrate layer disposed between said first and second metallization layers; and a plurality of conductive vias extending through said dielectric substrate layer and electrically connecting portions of said first and second metallization layers, said multilayer microwave or mm-wave circuit being a flexible circuit. [emphasis added].

Thus, claim 1 requires a “flexible” circuit including a “first metallization layer” operable at “a frequency ranging from 20GHz to 100 GHz”, and a “dielectric substrate layer” with “vias” extending therethrough. As discussed below, Kosugi fails to disclose or suggest such an

invention.

Kosugi teaches a microwave package structure including a flexible mother substrate 10 and a semiconductor element 4 enclosed within a circuit module 1. The mother substrate 10 is comprised of a center conductor layer 11_m sandwiched between grounding layers 12_{m1}, 12_{m2}. The mother substrate 10 includes conductor vias 5, 6 extending both partially, and completely, therethrough. The conductor vias 5 connect the center conductor layer 11_m to the conductor layer 11_c within the circuit module 1, and the conductor vias 6 connect the grounding layers 12_{m1}, 12_{m2} to the grounding layers 12_{c1}, 12_{c2} within the circuit module. As previously argued, the conductor vias 5, 6 do not couple the conductor layer 11_m to the grounding layers 12_{m1}, 12_{m2}.

The Examiner argues that “at least via 5_m [is] coupled between center conductive layer 11_m and ground layer 12_{m2}”. The Applicant submits that although it may appear from a cursory review of Figure 1 of Kosugi that conductor via 5_m is coupled to ground layer 12_{m2} at the bump (30) portion thereof; as explained below, this is actually not the case.

First, consider the function of conductor via 5_m. Conductor via 5_m is adapted to couple a signal on conductive layer 11_m to conductive layer 11_c (see, col. 2, line 63 to col. 3, line 36). If conductor via 5_m were coupled to ground layer 12_{m2} at bump 30, the signal would never reach conductive layer 11_c, as it would be directly grounded to the layer 12_{m2}.

Next, consider the disclosure of Kosugi. Kosugi teaches that the “grounding conductor layer 12_{m2} has exceptional non-grounding parts, i.e., the electrodes 5a and 9a...” (see, col. 3, lines 39-41). The conductor via 5_m is directly coupled to the electrode 5a (See Fig. 2A), and thus if the electrode 5a is “non-grounding” (i.e., conductive), so must the conductor via 5_m be. If the conductor via 5_m were coupled to ground layer 12_{m2} at bump 30, the electrode 5a would cease to be “non-grounding”, and this does not make logical, or engineering, sense in the context of the Kosugi patent.

Finally, Figures 1, 2A and 2B, when viewed in conjunction with one another, reveal that the conductor via 5_m is not coupled to the ground layer 12_{m2} at bump 30. The conductor via 5_m is coupled at a first end thereof to conductive layer 11_m (See Fig. 1). From that point the conductor via proceeds up through the substrate 10 to the upper surface thereof where it contacts electrode

5a and the bump 30 (See Fig. 2A). The bump 30 however, does not contact the ground vias 6 that surround the conductor via 5_m. Moving upward the conductor via 5_m next contacts the electrode 5a on the circuit module 1 (See Fig. 2B). The conductor via 5_m proceeds upward to finally contact the conductive layer 11_c within the circuit module. At no point does the conductor via 5_m connect to the ground layer 12_{m2}.

As previously asserted in the Response of May 28, 2003, Kosugi fails to disclose or suggest a "dielectric substrate layer" disposed between first and second metallization layers and having a "plurality of conductive vias" extending therethrough and "electrically connecting" portions of the first and second metallization layers, as recited in claim 1. First of all, the term "dielectric" has a well-established meaning in the art. The Penguin Dictionary of Electronics, Second Edition (1988) defines "dielectric" as "a solid, liquid, or gaseous material that can sustain an electric field and act as an insulator." The conductor layer 11_m sandwiched between the grounding layers 12_{m1}, 12_{m2} is most certainly not a "dielectric" because it is a 'conductor' of electrical energy, not an insulator. Further, Kosugi discloses no other dielectric layers.

Additionally, the conductor vias 5, 6 disclosed by Kosugi do not 'electrically connect' portions of the conductor layer 11_m to portions of the grounding layers 12_{m1}, 12_{m2}. As explained above, the conductor vias 5, 6 couple the signals on conductor layer 11_m, and grounding layers 12_{m1}, 12_{m2}, to similar layers within the circuit module 1. In light of the foregoing, reconsideration and withdrawal of this rejection with respect to claim 1 is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

Claims 2-22 stand rejected under 35 U.S.C. § 103(a) as being obvious over Kosugi taken alone. In view of the following remarks, reconsideration and withdrawal of this ground of rejection is respectfully requested.

As noted above, Kosugi fails to disclose or suggest a "dielectric substrate layer" disposed between first and second metallization layers and having a "plurality of conductive vias" extending therethrough and "electrically connecting" portions of the first and second metallization layers, as recited in claim 1. Since claims 2-22 are all dependent upon claim 1, and

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Kosugi fails to meet the limitations of claim 1 as discussed above, reconsideration and withdrawal of this ground of rejection with respect to claims 2-22 is requested.

Conclusion

In view of the foregoing remarks, Applicants submit that this application is in condition for allowance at an early date, which action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'P. A. Taufer', is written over a horizontal line.

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